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Iwasa et al.

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(54) **IMAGE PROCESSING APPARATUS**

(71) Applicants: **Keisuke Iwasa**, Kanagawa (JP); **Yoh Masuyama**, Kanagawa (JP); **Tadashi Nagata**, Kanagawa (JP)

(72) Inventors: **Keisuke Iwasa**, Kanagawa (JP); **Yoh Masuyama**, Kanagawa (JP); **Tadashi Nagata**, Kanagawa (JP)

(73) Assignee: **RICOH COMPANY, LTD.**, Tokyo (JP)

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H04N 1/00 (2006.01)
G06K 15/00 (2006.01)

(52) **U.S. Cl.**
CPC ***H04N 1/0083*** (2013.01); ***G06K 15/401*** (2013.01); ***G06K 15/4025*** (2013.01); ***H04N 1/21*** (2013.01)

(58) **Field of Classification Search**
CPC G06K 15/401; G06K 15/4025; H04N 1/0083; H04N 1/21
USPC 358/1.1–1.9, 1.11–1.18
See application file for complete search history.

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Primary Examiner — King Poon
Assistant Examiner — Ibrahim Siddo
(74) *Attorney, Agent, or Firm* — IPUSA, PLLC

(57) **ABSTRACT**

An image processing apparatus includes an operations unit configured to be directly operated by a user; a main unit configured to operate based on a request from the operations unit; a determination unit configured to determine a device that is to use an external storage device of the operations unit, in accordance with one of a function of the main unit that is activated through the operations unit and an application of the operations unit; and a switching unit configured to switch a current connection of the external storage device to a connection between the determined device and the external storage device.

8 Claims, 5 Drawing Sheets

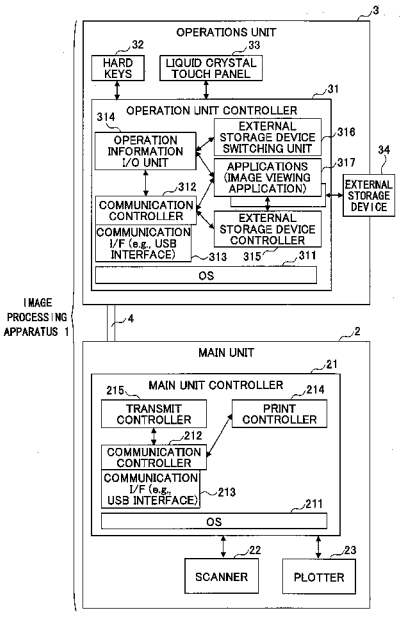

FIG.1

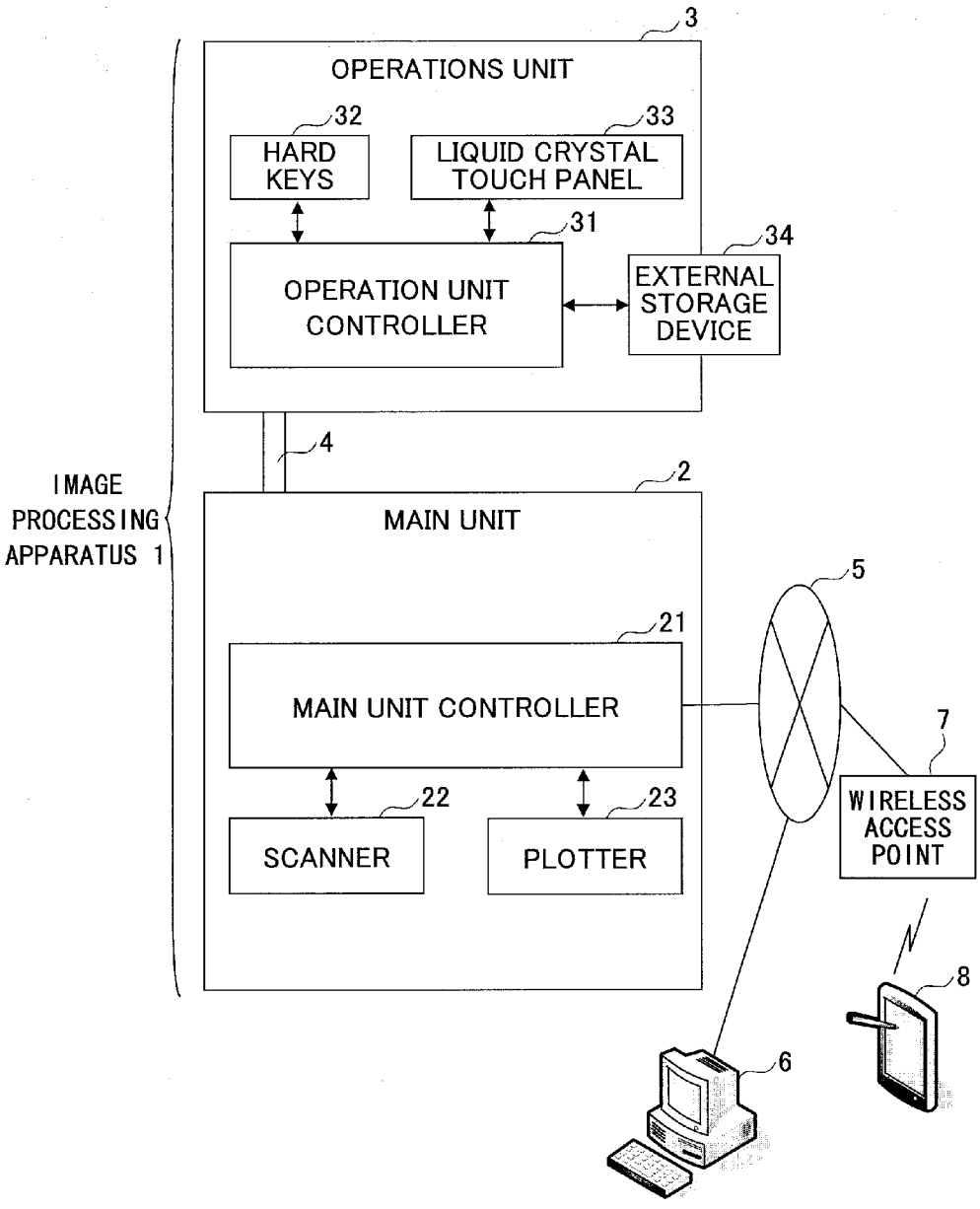
3
OPERATIONS UNIT
32
HARD KEYS
33
LIQUID CRYSTAL TOUCH PANEL
31
34
OPERATION UNIT CONTROLLER
EXTERNAL STORAGE DEVICE
4
2
IMAGE PROCESSING APPARATUS 1
MAIN UNIT
5
21
MAIN UNIT CONTROLLER
7
22
23
SCANNER
PLOTTER
WIRELESS ACCESS POINT
8
6

FIG.2

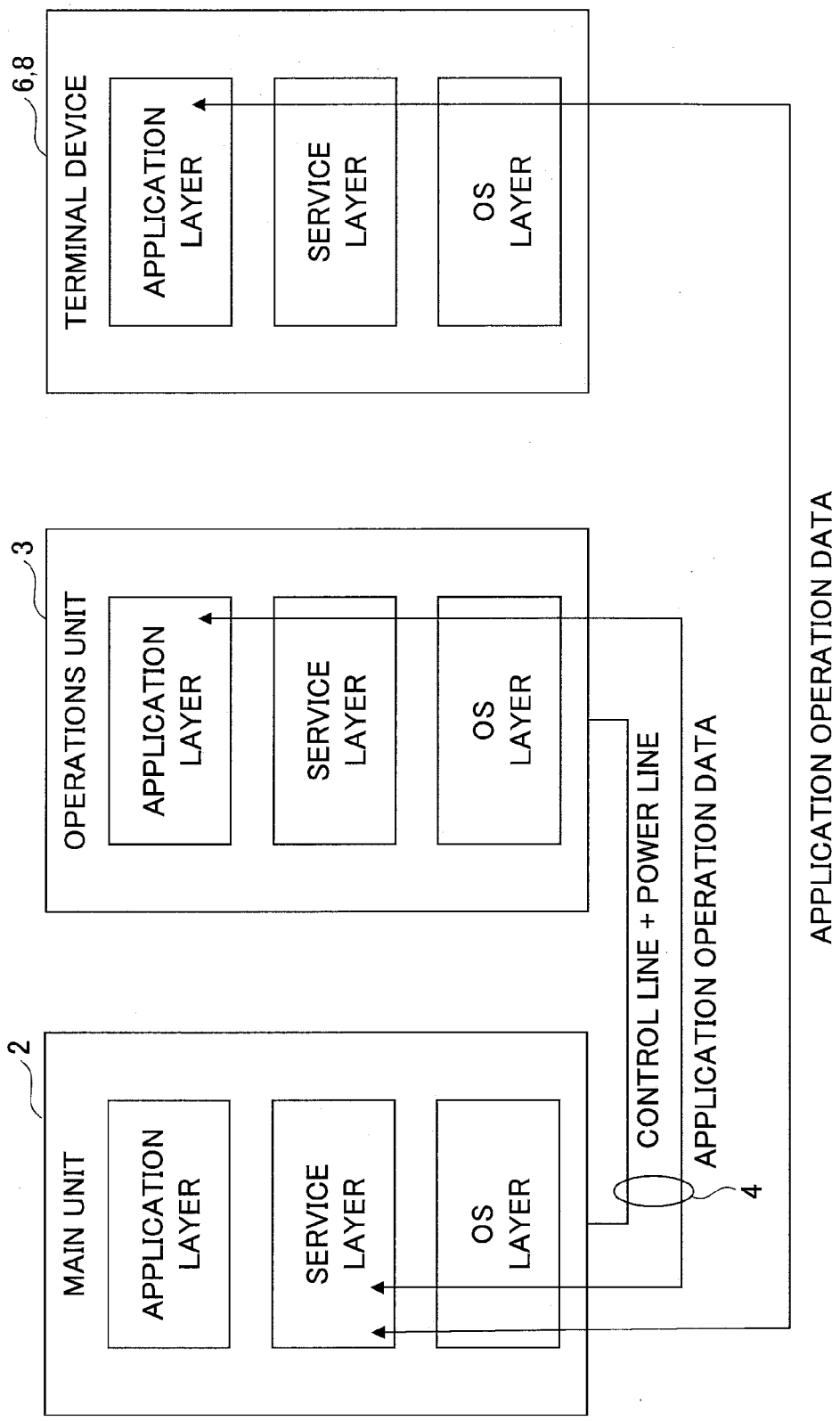
6,8
TERMINAL DEVICE
APPLICATION LAYER
SERVICE LAYER
OS LAYER
3
OPERATIONS UNIT
APPLICATION LAYER
SERVICE LAYER
OS LAYER
2
MAIN UNIT
APPLICATION LAYER
SERVICE LAYER
OS LAYER
CONTROL LINE + POWER LINE
APPLICATION OPERATION DATA
4
APPLICATION OPERATION DATA

FIG.3

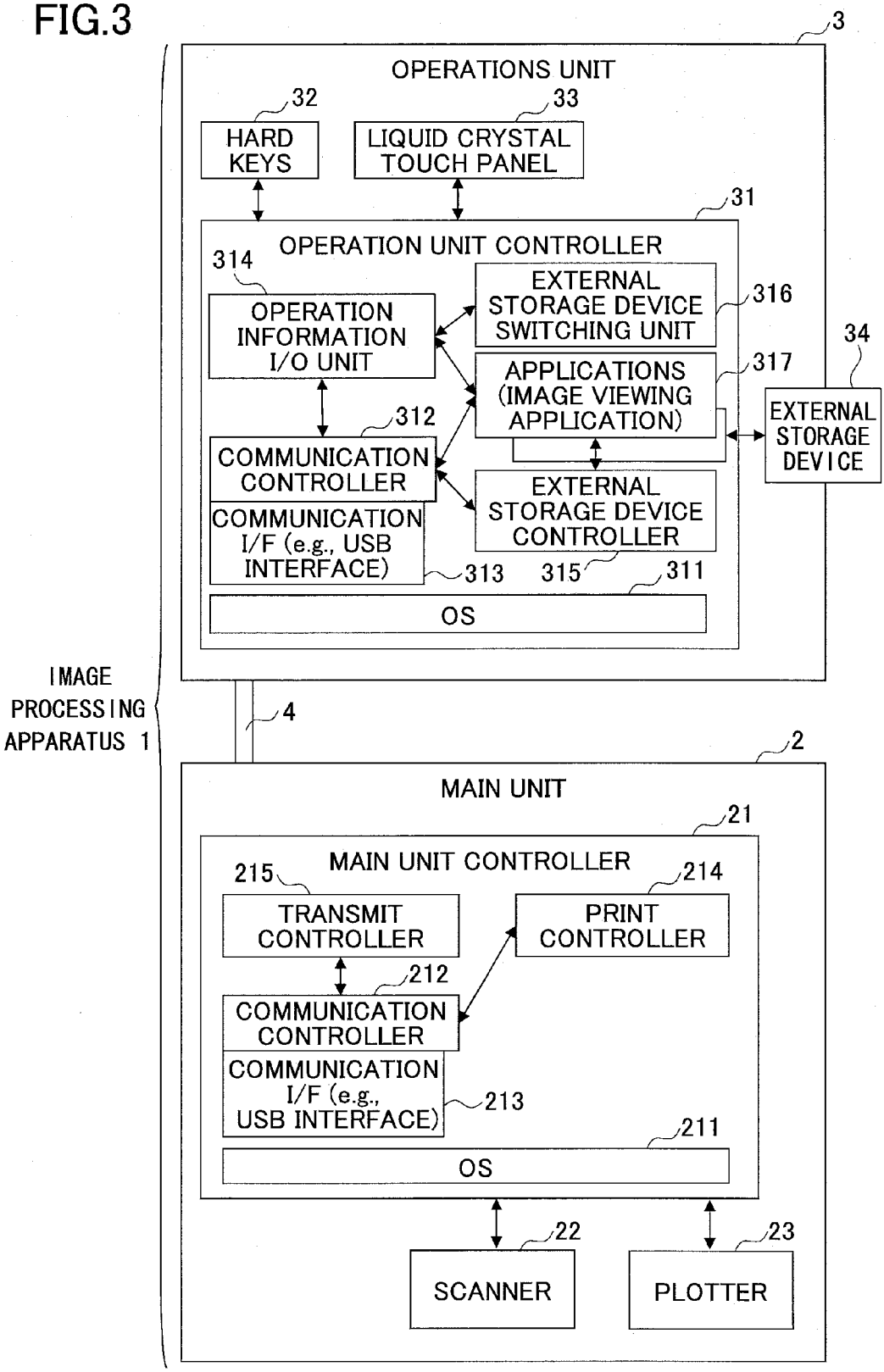
IMAGE PROCESSING APPARATUS 1
3
OPERATIONS UNIT
32
HARD KEYS
33
LIQUID CRYSTAL TOUCH PANEL
31
OPERATION UNIT CONTROLLER
314
OPERATION INFORMATION I/O UNIT
EXTERNAL STORAGE DEVICE SWITCHING UNIT
316
APPLICATIONS (IMAGE VIEWING APPLICATION)
317
34
EXTERNAL STORAGE DEVICE
312
COMMUNICATION CONTROLLER
EXTERNAL STORAGE DEVICE CONTROLLER
COMMUNICATION I/F (e.g., USB INTERFACE)
313
315
311
OS
4
2
MAIN UNIT
21
MAIN UNIT CONTROLLER
215
214
TRANSMIT CONTROLLER
PRINT CONTROLLER
212
COMMUNICATION CONTROLLER
COMMUNICATION I/F (e.g., USB INTERFACE)
213
211
OS
22
23
SCANNER
PLOTTER

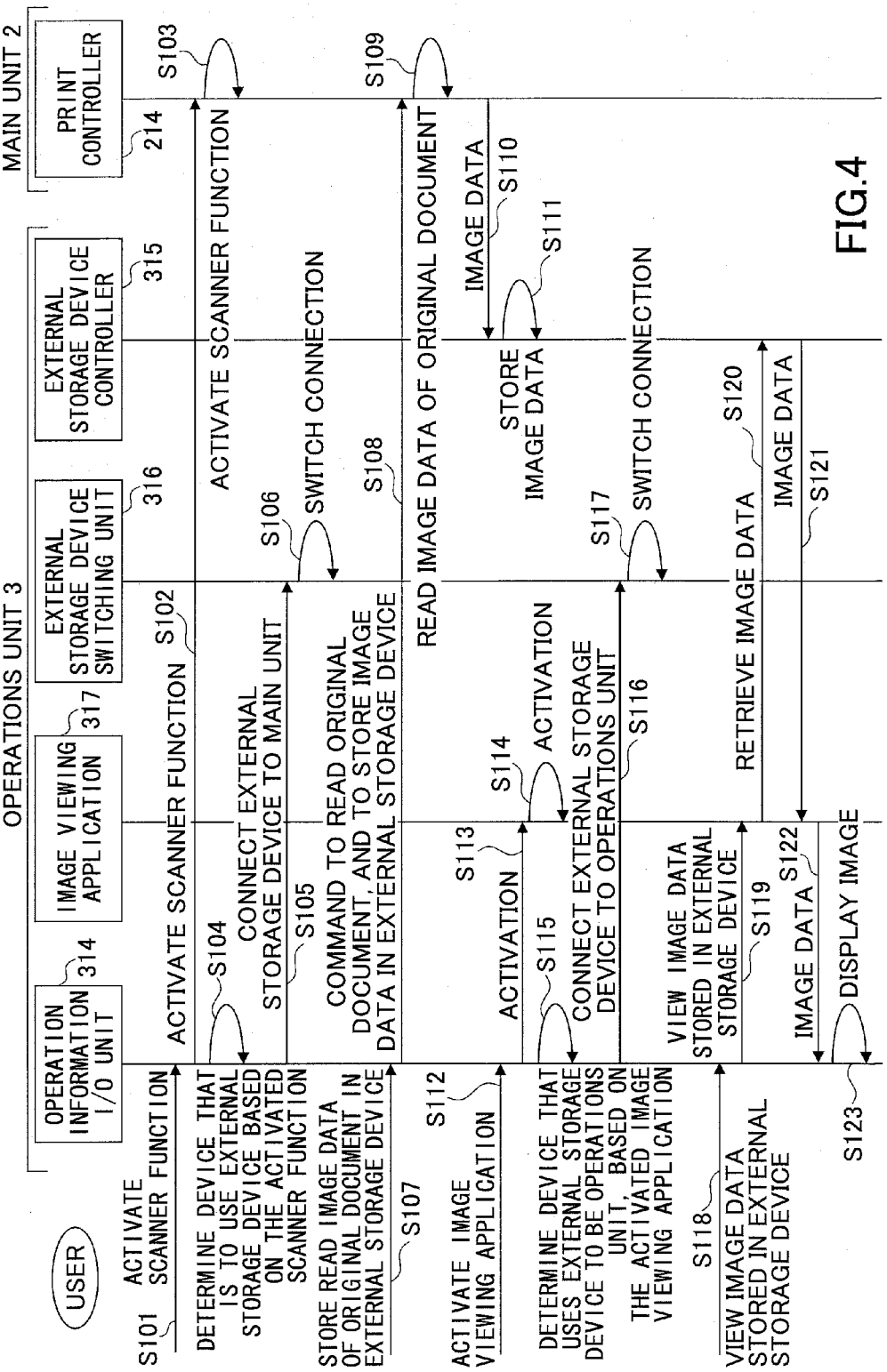
USER
OPERATIONS UNIT 3
OPERATION INFORMATION I/O UNIT
314
IMAGE VIEWING APPLICATION
317
EXTERNAL STORAGE DEVICE SWITCHING UNIT
316
EXTERNAL STORAGE DEVICE CONTROLLER
315
MAIN UNIT 2
PRINT CONTROLLER
214
S101 ACTIVATE SCANNER FUNCTION
ACTIVATE SCANNER FUNCTION
S102
S103
ACTIVATE SCANNER FUNCTION
DETERMINE DEVICE THAT IS TO USE EXTERNAL STORAGE DEVICE BASED ON THE ACTIVATED SCANNER FUNCTION
S104
CONNECT EXTERNAL STORAGE DEVICE TO MAIN UNIT
S105
S106
SWITCH CONNECTION
STORE READ IMAGE DATA OF ORIGINAL DOCUMENT IN EXTERNAL STORAGE DEVICE
S107
COMMAND TO READ ORIGINAL DOCUMENT, AND TO STORE IMAGE DATA IN EXTERNAL STORAGE DEVICE
S108
READ IMAGE DATA OF ORIGINAL DOCUMENT
S109
IMAGE DATA
S110
S111
STORE IMAGE DATA
ACTIVATE IMAGE VIEWING APPLICATION
S112
S113
ACTIVATION
S114
ACTIVATION
DETERMINE DEVICE THAT USES EXTERNAL STORAGE DEVICE TO BE OPERATIONS UNIT, BASED ON THE ACTIVATED IMAGE VIEWING APPLICATION
S115
CONNECT EXTERNAL STORAGE DEVICE TO OPERATIONS UNIT
S116
S117
SWITCH CONNECTION
VIEW IMAGE DATA STORED IN EXTERNAL STORAGE DEVICE
S118
S119
RETRIEVE IMAGE DATA
S120
IMAGE DATA
S121
IMAGE DATA
S122
DISPLAY IMAGE
S123

FIG.4

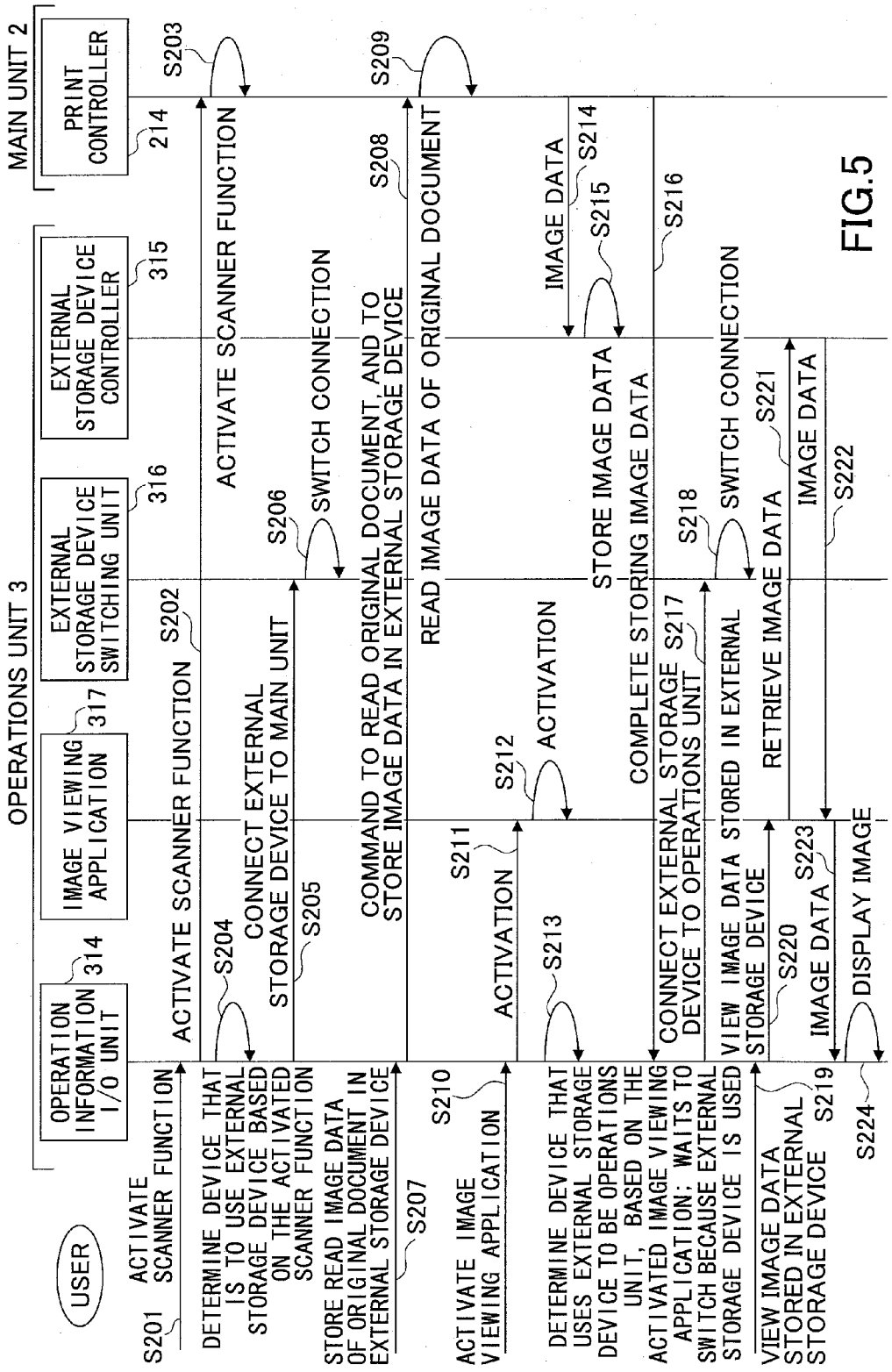
USER
OPERATIONS UNIT 3
MAIN UNIT 2
OPERATION INFORMATION I/O UNIT 314
IMAGE VIEWING APPLICATION 317
EXTERNAL STORAGE DEVICE SWITCHING UNIT 316
EXTERNAL STORAGE DEVICE CONTROLLER 315
PRINT CONTROLLER 214
S201 ACTIVATE SCANNER FUNCTION
ACTIVATE SCANNER FUNCTION S202
S203
DETERMINE DEVICE THAT IS TO USE EXTERNAL STORAGE DEVICE BASED ON THE ACTIVATED SCANNER FUNCTION
S204
CONNECT EXTERNAL STORAGE DEVICE TO MAIN UNIT
S205
S206
SWITCH CONNECTION
STORE READ IMAGE DATA OF ORIGINAL DOCUMENT IN EXTERNAL STORAGE DEVICE
S207
COMMAND TO READ ORIGINAL DOCUMENT AND TO STORE IMAGE DATA IN EXTERNAL STORAGE DEVICE
S208
S209
READ IMAGE DATA OF ORIGINAL DOCUMENT
S210
ACTIVATE IMAGE VIEWING APPLICATION
S211
ACTIVATION
S212
ACTIVATION
DETERMINE DEVICE THAT USES EXTERNAL STORAGE DEVICE TO BE OPERATIONS UNIT, BASED ON THE ACTIVATED IMAGE VIEWING APPLICATION; WAITS TO SWITCH BECAUSE EXTERNAL STORAGE DEVICE IS USED
S213
IMAGE DATA
S214
S215
STORE IMAGE DATA
S216
COMPLETE STORING IMAGE DATA
CONNECT EXTERNAL STORAGE DEVICE TO OPERATIONS UNIT
S217
S218
SWITCH CONNECTION
VIEW IMAGE DATA STORED IN EXTERNAL STORAGE DEVICE
S219
RETRIEVE IMAGE DATA
S220
S221
IMAGE DATA
S222
IMAGE DATA
S223
DISPLAY IMAGE
S224

FIG.5

IMAGE PROCESSING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a control technique of an image processing apparatus.

2. Description of the Related Art

A multi function peripheral and a multi function printer (MFP) are examples of an image processing apparatus. In general, an image processing apparatus includes a main unit and an operations unit. The operations unit is a unit with which a user can operate the image processing apparatus. For example, an operations unit may include a display that displays an operations screen, and a key pad for key input operation. For such an image processing apparatus, a configuration may be considered such that an operations unit is separated from a main unit. With such a configuration, even if the processing load of the main unit is heavy, the latency of a response to an input operation can be avoided. In the operations unit, an independent operating system (OS), such as the Android OS, is installed. The operations unit can operate independently from the main unit.

In order to facilitate transferability of image data or a program, the operations unit is provided with a slot for a memory card or the like. With such a configuration, a memory card or the like, as an external storage device, may be detachably attached to the operations unit.

A device (e.g., the main unit or the operations unit) that uses the external storage device may depend on usage of the external storage device.

Examples of the use for which the main unit uses the external storage device may include the following:

- to print out a file stored in the external storage device;
- to store a scanned image in the external storage device;
- to store a result of self-diagnosis by the main unit; and
- to update an application of the main unit by using the external storage unit.

Examples of the use for which the operations unit uses the external storage device may include the following:

- to store an image edited by the operations unit in the external storage device;
- to update an application of the operations unit by using the external storage device;
- to store a mail received by the operations unit in the external storage device;
- to view an image file stored in the external storage device by using the operations unit; and
- to store a log of operation of the operations unit in the external storage device.

An OS executed by the main unit may be different from an OS executed by the operations unit. It may not be efficient to provide a file sharing function or the like for such an embedded system. Accordingly, for each time the external storage device is used, connection to (or mounting of) the external storage device may be switched for a device (e.g., the main unit or the operations unit) that uses the external device.

Patent Document 1 (Japanese Patent No. 4135735) discloses a method of switching an operation mode of an image processing apparatus. According to the disclosed method, upon insertion of a medium, a state of an original document is detected and a determination is made as to whether a file is stored in the medium, and an operation mode of the image processing apparatus is switched to a scanning mode or a print mode. In this manner, an attempt has been made to improve operability of the image processing apparatus.

SUMMARY OF THE INVENTION

According to an aspect of the present invention, there is provided an image processing apparatus including an operations unit configured to be directly operated by a user; a main unit configured to operate based on a request from the operations unit; a determination unit configured to determine a device that is to use an external storage device of the operations unit, in accordance with one of a function of the main unit that is activated through the operations unit and an application of the operations unit; and a switching unit configured to switch a current connection of the external storage device to a connection between the determined device and the external storage device.

According to another aspect of the present invention, there is provided an image processing system including an image processing apparatus that includes an operations unit configured to be directly operated by a user, and a main unit configured to operate based on a request from the operations unit; a determination unit configured to determine a device that is to use an external storage device of the operations unit, in accordance with one of a function of the main unit that is activated through the operations unit and an application of the operations unit; and a switching unit configured to switch a current connection of the external storage device to a connection between the determined device and the external storage device.

According to another aspect of the present invention, there is provided a non-transitory computer readable recording medium storing an image processing program, the image processing program causes a computer being a controller of an image processing apparatus including an operations unit configured to be directly operated by a user, and a main unit configured to operate based on a request from the operations unit to operate as a determination unit configured to determine a device that is to use an external storage device of the operations unit in accordance with one of a function of the main unit that is activated through the operations unit and an application of the operations unit; and a switching unit configured to switch a current connection of the external storage device to a connection between the determined device and the external storage device.

Other objects, features and advantages of the present invention will become more apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a diagram showing an example of a configuration of an image processing apparatus according to an embodiment of the present invention;

FIG. **2** is a diagram showing an example of a flow of application operation data, when an operations unit or an application of a terminal device utilizes a function of a main unit;

FIG. **3** is a diagram showing an example of a configuration of a main unit controller and an example of a configuration of an operations unit controller;

FIG. **4** is a sequence diagram showing an example of processing according to the embodiment; and

FIG. **5** is a sequence diagram showing another example of the processing according to the embodiment.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Under the existing circumstances, depending on whether the external storage device of the operations unit is to be used by the main unit or by the operations unit, a device that is to use the external storage device is manually switched. Each time a device that is to use the external storage device is to be switched, a user may be required to open a setting screen so as to perform switching operation to switch the device. Namely, there is a need to improve operability.

Unfortunately, the method disclosed in Patent Document 1 is not for an image processing apparatus such that a main unit and an operations unit are separated. Accordingly, the method may not be applied to such an image processing apparatus for improving the operability of switching a device that is to use the external storage device.

There is a need for improving the operability of switching a device that is to use the external storage device. It is desirable that a user may not be required to open a setting screen and manually switch a device, when the device that uses the external device is to be switched.

According to an embodiment of the present invention, when a device that uses the external device is to be switched, a user may not be required to open a setting screen and manually switch a device. Accordingly, operability may be improved.

Hereinafter, the embodiment of the present invention is explained.

<Configuration>

FIG. **1** is a diagram showing an example of a configuration of an image processing apparatus **1** according to the embodiment of the present invention.

Referring to FIG. **1**, the image processing apparatus **1** includes a main unit **2**; and an operations unit **3**. The operations unit **3** is connected to the main unit **2** through a cable **4**. Here, instead of the wired connection by the cable **4**, the main unit **2** and the operations unit **3** may be wirelessly connected (which includes connection based on infrared technology).

The main unit includes a main unit controller **21**; a scanner **22**; and a plotter **23**. The main unit controller **21** controls operations of the main unit **2**. The scanner **22** can read an original document. The plotter **23** can print an image on a sheet.

The main unit **2** can be accessed from a terminal device **6** (e.g., a personal computer (PC)) through a network **5** (e.g., a local area network (LAN), a wide area network (WAN), or the Internet). The main unit **2** can also be accessed from a terminal device **8** (e.g., a smart phone, or a tablet computer) through a wireless access point **7**. The main unit **2** may be directly accessed by the terminal device **8** by using short range radio communication (e.g., communication based on Bluetooth (registered trade mark)).

The operations unit **3** includes an operations unit controller **31**; hard keys **32**; a liquid crystal touch panel **33**; and an external storage device **34**. The operations unit controller **31** controls operations of the operations unit **3**. The hard keys **32** can be operated by a user. The liquid crystal touch panel **33** can display a screen. The liquid crystal touch panel **33** can receive an operation input. The external storage device **34** can be detachably attached to the operations unit **3**. For example, the external storage device **34** may be a memory card.

FIG. **2** is a diagram showing an example of a flow of application operation data, when the operation unit **3** or an application of the terminal **6** or the terminal **8** utilizes a function of the main unit **2**.

As shown in FIG. **2**, the cable **4** may include a control line and a power line. The control line and the power line may be extended from the main unit **2**, and the control line and the power line may be connected to the operations unit **3**. Application operation data from an application layer of the operations unit **3** can be transmitted to a service layer of the main unit **2** through the cable **4**. Application operation data from an application layer of the terminal device **6** can be transmitted to the service layer of the main unit **2** through the network **5**. Similarly, application operation data from an application layer of the terminal device **8** can be transmitted to the service layer of the main unit **2** through the network **5**.

FIG. **3** is a diagram showing an example of a configuration of the main unit controller **21** and an example of a configuration of the operations unit controller **31**.

As shown in FIG. **3**, the main unit controller **21** of the main unit **2** includes an operating system (OS) **211**; a communication controller **212**; a communication interface **213**; a print controller **214**; and a transmit controller **215**.

The OS **211** is system software of the main unit controller **21**.

The communication controller **212** may control data communication with the operations unit **3**, the terminal **6**, or the terminal **8** (cf. FIG. **1**) through the communication interface **213**. The communication interface **213** may be a communication device, such as a communication device for a universal serial bus (USB) based communication, serial communication, wired communication, a wireless LAN based communication, Bluetooth based communication, or Infrared Data Association (IrDA) based communication, for example. The communication controller **212** can forward data received from an external device to the print controller **214** and/or to the transmit controller **215**. The communication controller **212** can transmit data received from the print controller **214** and/or the transmit controller **215** to an external device.

The print controller **214** controls the scanner **22** and the plotter **23**, for example. The print controller **214** can control execution of a print job.

The transmit controller **215** can control execution of a transmit job, such as mail transmission, or folder transfer.

The operations unit controller **31** of the operations unit **3** includes an OS **311**; a communication controller **312**; a communication interface **313**; an operation information input/output unit **314**; an external storage device controller **315**; an external storage device switching unit **316**; and various types of applications **317**.

The OS **311** is system software of the operations unit controller **31**.

The communication controller **312** can control data communication with the main unit **2** through the communication interface **313**. The communication interface **313** may be a communication device, such as a communication device for a universal serial bus (USB) based communication, serial communication, wired communication, a wireless LAN based communication, Bluetooth based communication, or Infrared Data Association (IrDA) based communication, for example. The communication controller **312** can forward data received from an external device to the operation information input/output unit **314**, the external storage device controller **315**, the external storage device switching unit **316**, and/or the various types of applications **317**. The communication controller **312** can transmit data received from the operation information input/output unit **314**, the external storage device controller **315**, the external storage device switching unit **316**, and/or the various types of applications **317** to an external device.

The operation information input/output unit **314** can display a screen to a user by using the liquid crystal touch panel

33. The operation information input/output unit **314** can receive user operation through the hard keys **32**, or through the liquid crystal touch panel **33**. The operation information input/output unit **314** stores correspondence between functions of the main unit **2** and devices that use the external storage device **34**. The operation information input/output unit **314** stores correspondence between applications of the operations unit **3** and devices that user the external storage device **34**. The operation information input/output unit **314** can determine a device that is to use the external storage device **34**, depending on a function of the main unit **2** activated by the operations unit **3**, or an application of the operation unit **3**.

The external storage device controller **315** can detect insertion (attachment) of the external storage device **34**, and detachment of the external storage device **34**. The external storage device controller **315** can read out data stored in the external storage device **34**. The external storage device controller **315** can write data into the external storage device **34**.

The external storage device switching unit **316** can switch a device that is to use the external storage device **34**. For example, when the external storage device **34** is mounted to (i.e., connected to) the operations unit **3**, and when the main unit **2** is to use the external storage device **34**, the external storage device switching unit **316** releases the mounting to (i.e., the connection to) the operations unit **3**, and subsequently the external storage device switching unit **316** mounts (i.e., connects) the external storage device **34** as a storage unit of the main unit **2** through USB-based connection, for example. Here, mounting makes the external storage device **34** available for use. As another example, when the external storage device **34** is mounted to (i.e., connected to) the main unit **2**, and when the operations unit **3** is to use the external storage device **34**, the external storage device switching unit **316** releases the mounting to (i.e., the connection to) the main unit **2**, and subsequently the external storage device switching unit **316** mounts (i.e., connects) the external storage device **34** to the operations unit **3**.

The applications **317** may be application programs, such as an application program for viewing an image that can be executed on the side of the operations unit **3**.

Here, functions included in the main unit **2** are not necessarily installed in the main unit **2**. Similarly, functions included in the operations unit **3** are not necessarily installed in the operations unit **3**. For example, such functions can be provided as functions that are available on a network.

<Operation>

FIG. **4** is a sequence diagram showing an example of processing according to the embodiment.

Referring to FIG. **4**, when a user inputs a command for activating a scanner function to the operation information input/output unit **314** through the hard keys **3** or the liquid crystal touch panel **33** of the operations unit **3** (step S**101**), the operation information input/output unit **314** transmits a request for activating the scanner function to the print controller **214** of the main unit **2** (step S**102**). In response to the request, the print controller **214** activates the scanner function (step S**103**).

The operation information input/output unit **314** of the operations unit **3** determines that the main unit **2** is to use the external storage unit **34** (step **5104**) because the scanner function is activated. In other words, when the scanner function reads an original document, the main unit **2** creates image data based on the read data. In order to store the image data in the external storage device **34**, the external device **34** may be connected to the main unit **2**.

The operation information input/output unit **314** commands the external storage device switching unit **316** to establish connection between the external storage device **34** and the main unit **2** (step S**105**). In response to this, the external storage device switching unit **316** establishes the connection between the external storage device **34** and the main unit **2** (step S**106**).

Subsequently, when the user inputs a command for storing image data (which is to be created by reading an original document) in the external storage device **34** to the operation information input/output unit **314** through the hard keys **32** or the liquid crystal touch panel **33** of the operations unit **3** (step S**107**), the operation information input/output unit **314** commands the print controller **214** of the main unit **2** to read the original document, and to store the image data in the external storage device **34** (step S**108**). In response to this, the print controller **214** reads the original document by using the scanner function (step S**109**). Then, the print controller **214** transmits the read image data to the external storage device controller **315** of the operations unit **3** (step S**110**). The external storage device controller **315** stores the image data in the external storage device **34** (step S**111**).

Next, when the user inputs a command for activating an image viewing application to the operation information input/output unit **314** through the hard keys **32** or the liquid crystal touch panel **33** of the operations unit **3** (step S**112**), the operation information input/output unit **314** commands the image viewing application **317** to be activated (step S**113**). In response to this, the image viewing application **317** is activated (step S**114**).

The operation information input/output unit **314** determines that the operations unit **3** is to use the external storage device **34** (step S**115**) because the image viewing application **317** is activated. Namely, the image viewing application **317** is to be executed on the operations unit **3**. In order to access the external storage device **34** that stored the read image data, the external storage device **34** can be connected to the operations unit **3**.

The operation information input/output unit **314** commands the external storage device switching unit **316** to establish connection between the external storage device **34** and the operations unit **3** (step S**116**). In response to this, the external storage device switching unit **316** establishes the connection between the external storage device **34** and the operations unit **3** (step S**117**).

Subsequently, when the user inputs a command for viewing the image data stored in the external storage device **34** to the operation information input/output unit **314** through the hard keys **32** or the liquid crystal touch panel **33** of the operations unit (step S**118**), the operation information input/output unit **314** commands the application **317** to read the image data stored in the external storage device **34** (step S**119**).

The application **317** retrieves the image data stored in the external storage device **34** through the external storage device controller **315** (steps S**120** and S**121**). Then, the application **317** processes the image data to create a preview screen. The application **317** transmits image data of the preview screen to the operation information input/output unit **314** (step S**122**). The operation information input/output unit **314** displays the preview screen to the user, based on the received image data (step S**123**).

In the above-described example, after the user activates the function of the main unit **2** or the application of the operations unit **3** (cf. steps S**101** and S**112**), the device that is to use the external storage device **34** is determined (cf. steps S**104** and S**115**), and the connection to the external storage device **34** is

established (cf. steps S106 and S117). In this case, information may be displayed to the user to indicate that the device that is to use the external storage device 34 is automatically switched. Alternatively or additionally, the user may be queried as to whether to switch the device that is to use the external storage device 34, and a determination may be made as to whether to switch the device, based on a command of the user.

FIG. 5 is a sequence diagram showing another example of the processing according to the embodiment. In this example, during use of the external storage device 34, the device that is to use the external storage device 34 is not to be switched. Upon completing use of the external storage device 34, the device that is to use the external storage device 34 is switched.

Referring to FIG. 5, when a user inputs a command for activating a scanner function to the operation information input/output unit 314 through the hard keys 32 or the liquid crystal touch panel 33 of the operations unit 3 (step S201), the operation information input/output unit 314 transmits a request for activating the scanner function to the print controller 214 of the main unit 2 (step S202). In response to the request, the print controller 214 activates the scanner function (step S203).

The operation information input/output unit 314 of the operations unit 3 determines that the main unit 2 is to use the external storage unit 34 (step S204) because the scanner function is activated. In other words, when the scanner function reads an original document, the main unit 2 creates image data based on the read data. In order to store the image data in the external storage device 34, the external storage device 34 can be connected to the main unit 2.

The operation information input/output unit 314 commands the external storage device switching unit 316 to establish connection between the external storage device 34 and the main unit 2 (step S205). In response to this, the external storage device switching unit 316 establishes the connection between the external storage device 34 and the main unit 2 (step S206).

Subsequently, when the user inputs a command for storing image data (which is to be created by reading an original document) in the external storage device 34 to the operation information input/output unit 314 through the hard keys 32 or the liquid crystal touch panel 33 of the operations unit 3 (step S207), the operation information input/output unit 314 commands the print controller 214 of the main unit 2 to read the original document, and to store the image data in the external storage device 34 (step S208). In response to this, the print controller 214 reads the original document by using the scanner function (step S209). Here, it is assumed that it takes some time to read the original document.

In parallel to this, when the user inputs a command for activating an image viewing application to the operation information input/output unit 314 through the hard keys 32 or the liquid crystal touch panel 33 of the operations unit 3 (step S210), the operation information input/output unit 314 commands the image viewing application 317 to be activated (step S211). In response to this, the image viewing application 317 is activated (step S212).

The operation information input/output unit 314 determines that the operations unit 3 is to use the external storage device 34 because the image viewing application is activated. However, at this moment, the operation to store the read image data in the external storage device 34 is still continuing, and the external storage device 34 is used. Accordingly, the operation information input/output unit 314 waits to switch the connection (step S213).

Upon completion of reading the image by the print controller 214 of the main unit 2 (step S209), the print controller 214 transmits the read image data to the external storage device controller 315 of the operations unit 3 (step S214). Then, the external storage device controller 315 stores the image data in the external storage device 34 (step S215). Upon completion of storing of the image data in the external storage device 34, the print controller 214 reports to the operation information input/output unit 314 of the operations unit 3 that the storing is completed (step S216).

In response to this, the operation information input/output unit 314 stops waiting to switch the connection. The operation information input/output unit 314 commands the external storage device switching unit 316 to switch the connection from the connection between the external storage device 34 and the main unit 2 to the connection between the external storage device 34 and the operations unit 3 (step S217). In response to this, the external storage device switching unit 316 switches the connection from the connection between the external storage device 34 and the main unit 2 to the connection between the external storage device 34 and the operations unit 3 (step S218).

Subsequently, when the user inputs a command for viewing the image data stored in the external storage device 34 to the operation information input/output unit 314 through the hard keys 32 or the liquid crystal touch panel 33 of the operations unit (step S219), the operation information input/output unit 314 commands the image viewing application 317 to read the image data stored in the external storage device 34 (step S220).

The image viewing application 317 retrieves the image data stored in the external storage device 34 through the external storage device controller 315 (steps S221 and S222). Then, the image viewing application 317 processes the image data to create a preview screen. The image viewing application 317 transmits image data of the preview screen to the operation information input/output unit 314 (step S223). The operation information input/output unit 314 displays the preview screen to the user, based on the received image data (step S224).

Here, in order to enhance convenience, information may be displayed to the user to indicate a state of the switching of the external storage device 34. For example, information may be displayed to the user to indicate that switching is interrupted because the external storage device 34 is currently used. Additionally, information may be displayed to the user to indicate that storing of the image data in the external storage device 34 is completed, that the connection is switched, and that the connection is established between the external storage device 34 and the device that is to user the external storage device 34. Alternatively or additionally, even if the external storage device 34 is currently used, the user may be queried as to whether use of the external storage device 34 is to be interrupted, and the device that is to use the external storage device 34 is to be switched immediately. Then, a determination may be made as to whether the device is to be switched, based on a command of the user.

As described above, according to the embodiment, when a device that is to use an external storage device is to be switched, a user may not be required to open a setting screen and to switch the device that is to use the external storage device. Consequently, convenience of the user can be enhanced.

Hereinabove, the control technique of the image processing apparatus is explained by the embodiment. However, the present invention is not limited to the specifically disclosed

embodiment, and variations and modifications may be made without departing from the scope of the present invention.

Specific examples of numerical values are used in order to facilitate understanding of the invention. However, these numerical values are simply illustrative, and any other appropriate values may be used, except as indicated otherwise. A boundary of a functional unit or a processing unit in a functional block may not correspond to a boundary of a physical component. An operation by a plurality of functional units may be physically executed by a single component. Alternatively, an operation by a single functional unit may be physically executed by a plurality of components. For the convenience of explanation, the devices according to the embodiment of the present invention are explained by using the functional block diagrams. However, these devices may be implemented in hardware, software, or combinations thereof. The software may be prepared in any appropriate storage medium, such as a random access memory (RAM), a flash memory, a read-only memory (ROM), an EPROM, an EEPROM, a register, a hard disk drive (HDD), a removable disk, a CD-ROM, a database, a server, or the like.

The present application is based on and claims the benefit of priority of Japanese priority application No. 2013-025155 filed Feb. 13, 2013, the entire contents of which are hereby incorporated herein by reference.

What is claimed is:

1. An image processing apparatus comprising:

an operations unit configured to include an operation system and receive an input from a user, said operation unit having an external storage device installed therein;

a main unit configured to include another operation system that is independent of the operation system and operate based on a request from the operations unit;

a determination unit configured to determine which one of the operation unit or the main unit uses the external storage device of the operations unit, in accordance with one of a function of the main unit that is activated through the input from the user at the operations unit and an application of the operations unit that is activated through the input from the user at the operation unit; and

a switching unit configured to switch a connection of the external storage device by switching a device to be connected to the external storage device between the operations unit and the main unit based on the determination of the determination unit.

2. The image processing apparatus according to claim **1**, further comprising:

a query unit configured to query the user whether to switch the connection of the external storage device, prior to the connection of the external storage device being switched by the switching unit.

3. The image processing apparatus according to claim **1**

wherein the switching unit waits to switch the connection of the external storage device, during use of the external storage device.

4. The image processing apparatus according to claim **3**,

wherein, when the use of the external storage device is completed, the switching unit switches the connection of the external storage device.

5. The image processing apparatus according to claim **3**, further comprising:

a notifying unit configured to report to the user that the external storage device is used.

6. An image processing system comprising:

an image processing apparatus that includes an operations unit configured to include an operation system and receive an input from a user, said operation unit having an external storage device installed therein, and a main unit configured to include another operation system that is independent of the operation system and operate based on a request from the operations unit;

a determination unit configured to determine which one of the operation unit or the main unit uses the external storage device of the operations unit, in accordance with one of a function of the main unit that is activated through the input from the user at the operations unit and an application of the operations unit that is activated through the input from the user at the operation unit; and

a switching unit configured to switch a connection of the external storage device by switching a device to be connected to the external storage device between the operations unit and the main unit based on the determination of the determination unit.

7. A non-transitory computer readable recording medium storing an image processing program, the image processing program causes a computer being a controller of an image processing apparatus including an operations unit configured to include an operation system and receive an input from a user, said operation unit having an external storage device installed therein, and a main unit configured to include another operation system that is independent of all operation system and operate based on a request from the operations unit to operate as:

a determination unit configured to determine which one of the operation unit or the main unit uses the external storage device of the operations unit in accordance with one of a function of the main unit that is activated through the input from the user at the operations unit and an application of the operations unit that is activated through the input from the user at the operation unit; and

a switching unit configured to switch a connection of the external storage device by switching a device to be connected to the external storage device between the operations unit and the main unit based on the determination of the determination unit.

8. The image processing apparatus according to claim **1**, wherein when image data is scanned and stored in the external storage device and the operations unit receives an input from the user to activate an image viewing application at the operations unit thereafter, the switching unit switches the device to be connected to the external storage device from the main unit to the operations unit.

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